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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/825,555	03/23/2001	Norbert Trautmann	7781.0028-00	7587
22852	7590	05/10/2004	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 1300 I STREET, NW WASHINGTON, DC 20005			HECK, MICHAEL C	
			ART UNIT	PAPER NUMBER
			3623	

DATE MAILED: 05/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

### Application No.

09/825,555

### Applicant(s)

TRAUTMANN ET AL.

### Examiner

Michael Heck

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The following is a First Office Action in response to the application filed 23 March 2001. Claims 1-44 are pending in this application and have been examined on the merits as discussed below.

#### ***Drawings***

2. New corrected drawings are required in this application because the drawings utilize a non-English language. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

#### ***Specification***

3. The attempt to incorporate subject matter into this application by reference to Heilmann 1998, Schwindt 1998, Neumann & Schwindt 1999, Franck 1999, Trautmann 1998a, Neumann & Schwindt 1997, Trautmann 1998b, and Heilmann 1998a is improper because those documents have not been supplied nor is it apparent from the description which specific document is being recited.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. **Claims 1-44** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification describes a method of plant occupancy planning in the process industry by means of an integrative relaxation approach for the sequencing of a discontinuous batch production and allocation of resources over time to a set of operations arising from batch planning, however, fails to supply the details of the integrative relaxation approach, such as an equation(s), but rather only describes it. One of ordinary skill in the art would have to perform undue experimentation to derive and use the equation(s).

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claims 1-44** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As to **claim 1**, it is not clear where the preamble ends and the claimed invention starts. The use of the word "where" does not limit the scope of the claim or claim limitation. "Where" is language that suggests or makes optional but does not require steps to be performed

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or does not limit a claim to a particular structure (MPEP 2106 II C.) Therefore, if the preamble ends after "allocation of resources over time to a set of operations arising from batch planning", then there are no steps to the claimed invention. However, if the preamble ends after "A method of automated, computer-assisted plant occupancy planning in the process industry by" then the claimed invention is a "means of an integrative relaxation approach for the sequencing of a discontinuous batch production and allocation of resources over time to a set of operations arising from batch planning" and nothing more. **Claims 2-42 and 44** are related to the "Where" language as indicated above that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure, therefore, claims 2-42 and 44 are not given any patentable weight. **Claim 43** is the computer-readable medium of claim 1; therefore, claim 1 rejection is also applicable to claim 43. For examination purposes the examiner has interpreted claim 1 to be "means of an integrative relaxation approach for the sequencing of a discontinuous batch production and allocation of resources over time to a set of operations arising from batch planning". Specifically, the metes and bounds of the claimed invention are not determinable.

### ***Claim Rejections - 35 USC § 101***

7. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

**Claims 1-44** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The method of automated, computer-assisted plant occupancy planning in process industry by means of an integrative relaxation approach for the sequencing

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of a discontinuous batch production and allocation of resources over time to a set of operations arising from batch planning is purely a mathematical algorithm. A process that merely manipulates an abstract idea or performs a purely mathematical algorithm is non-statutory despite the fact that it might inherently have some usefulness. See MPEP 2106 IV B. 2. (b) (ii).

**Claims 1-42 and 44** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The basis of this rejection is set forth in a two-prong test of:

- (1) whether the invention is within the technological arts; and
- (2) whether the invention produces a useful, concrete, and tangible result.

For a claimed invention to be statutory, the claimed invention must be within the technological arts. Mere ideas in the abstract (i.e., abstract idea, law of nature, natural phenomena) that do not apply, involve, use, or advance the technological arts fail to promote the "progress of science and the useful arts" (i.e., the physical sciences as opposed to social sciences, for example) and therefore are found to be non-statutory subject matter. For the process claim to pass muster, the recited process must somehow apply, involve, use, or advance the technological arts. In the present case, claim 1 only recites an abstract idea. As to claim 1, the recited steps of where during their execution the operations use resources, which may be available in multiples, and where productional restrictions are to be taken into account in carrying out the operations, where the problem of plant occupancy planning to be optimized is modeled as a resource-constrained project scheduling problem, taking into account the productional restrictions, where each operation corresponds to an activity of the project, for which it is possible to define an execution mode, a start time and an completion time, where restrictions on the availability of

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required resources and temporal constraints are to be taken into account, in a first step of the modeled problem, a relaxation which simplifies the resource problem is formed, disregarding the restrictions on the availability of resources, and taking into account the productional restrictions of the type of minimum and maximum time lags between operations and all the productional restrictions of the production break type which are independent of the selection of resources for operations, in a second step for the relaxed problem of plant occupancy planning, the temporal scheduling problem is solved as a calendarization problem in networks with the help of an iterative method, where in a third step, the solution to the temporal scheduling problem is investigated for its feasibility with respect to the non-relaxed problem of plant occupancy planning, where, when it is found that restrictions on the availability of resources are violated in the solution of the temporal scheduling problem, these violations are solved by introducing precedence relationships, and if it is found that not all resources have been selected for carrying out an operation, those resources are selected, the second step of temporal scheduling and the third step of introducing precedence relationships or selecting resources are continued until a feasible plant occupancy plan has been found or until the constraints to be taken into account in the second step of temporal scheduling are contradictory, if a possibility investigated does not violate any productional restrictions, the plant occupancy plan is stored as a feasible solution, investigation of possibilities according to the third step which have not yet been reviewed is continued, and a best solution with regard to a selectable objective function that does not decrease in the completion times of the operations is determined from the feasible solutions determined in the second step does not apply, involve, use, or advance the technological arts since all of the recited steps can be performed in the mind of the user or by use of a pencil and

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paper. The method only constitutes an idea for plant occupancy planning in the process industry by means of an integrative relaxation approach for the sequencing of a discontinuous batch production and allocation of resources over time to a set of operations arising from batch planning, therefore, deemed to be directed to non-statutory subject matter.

As to technological arts recited in the preamble, mere recitation in the preamble (i.e., intended or field of use) or mere implications of employing a machine or article of manufacture to perform some or all of the recited steps does not confer statutory subject matter to an otherwise abstract idea unless there is positive recitation in the claim as a whole to breathe life and meaning into the preamble. In the present case, none of the recited steps are directed to anything in the technological arts as explained above. Looking at the claim as a whole, nothing in the body of the claim recites any structure or functionality to suggest that a computer performs the recited steps. Therefore, the preamble is taken to merely recite a field of use.

Additionally, for a claimed invention to be statutory, the claimed invention must produce a useful, concrete, and tangible result. In the present case, the claimed invention is purely a mathematical algorithm, therefore, does not meet the criteria for producing a useful, concrete, and tangible result as indicated above.

Looking at the claims as a whole, nothing in the body of the claims recite any structure or functionality to suggest that a computer performs a task. Since the claimed invention, as a whole, is not within the technological arts as explained above, the same rejection as stated above for claim 1 applies to **claims 2-42 and 44**.



***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. **Claims 1-44** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wedelin (U.S. Patent 5,343,388) in view of Matta et al. (Matta et al., Dynamic Production Scheduling for a Process Industry, Operations Research, Vol. 42, No. 3, May-June 1994, p. 492-503 [JSTOR]). Due to the infinite nature of the claims as pointed out in paragraph 6, the claimed invention is unpatentable over the cited prior art.

As to **claims 1-42 and 44**, Wedelin discloses a method of plant occupancy planning in the process industry comprising a method and apparatus for optimizing resource allocation that uses a probabilistic relaxation network technique for obtaining an optimal or near optimal assignment of available resources and available facilities (Abstract, col. 3, lines 1-10). Wedelin fails to teach discontinuous batch production. Matta et al. teach capacity-oriented production scheduling that assigns competing products to several single level, capacitated production lines over a finite number of periods where each line can produce only one product each period at a fixed rate. The rate, for example, can be based on the capacity of a batch reactor in chemical processing or the total square footage of tiles in a kiln can cure at one time in tile manufacturing (p. 492). The procedure obtains strong lower bounds by solving a Lagrangian relaxation problem (p. 493). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include the capacity-oriented production scheduling of Matta et al.

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with the teachings of Wedelin because Wedelin teach a faster, more efficient approach to solving computational optimization problems (col. 1, lines 65-67). Companies desire to minimize project cost and optimize the due-date performance to maximize the profit and customer retention. Developing an efficient procedure for scheduling production of all demand requirements helps minimize total production, inventory, and changeover costs and improves reliability in scheduled completion date, therefore, allowing companies to minimize project cost and optimize due-date performance while maximizing profit and customer retention.

**Claim 43** substantially recites the same limitations as that of claim 1 with the distinction of the recited method being a computer-readable medium. Hence the same rejection for claim 1 as applied above applies to claim 43.

### *Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Reyck et al. (Reyck et al., Local Search Methods for the Discrete Time/Resource Trade-off Problem in Project Networks, Operations Management Group, Department of Applied Economics, Katholieke Universiteit Leuven, 2 March 1998 [GOOGLE]) discloses a resource-constrained project scheduling problem that involve the non-preemptive scheduling of project activities subject to finish-start precedence constraints and renewable resource constraints.

- Knotts et al. (Knotts et al., Agent-Based Project Scheduling, IIE Transactions, Vol. 32, No. 5, May 2000, p.387-401 [PROQUEST]) disclose a multimode resource-constrained project scheduling problem with a total pool of renewable resources.
- Wall (Wall, A Generic Algorithm for Resource-Constrained Scheduling, Massachusetts Institute of Technology, June 1996 [GOOGLE]) discloses a generic algorithm for resource-constrained scheduling and concludes that combining the generic algorithm with another search algorithm should provide immediate improvement. A hybrid representation that explicitly contains both the resource-constraints as well as the precedence constraints would permit the algorithm to attack the both the resource-constraint perspective as well as the precedence/temporal constraint perspective.
- Sprecher (Sprecher, Scheduling Resource-Constrained Projects Competitively at Modest Memory Requirements, Management Science, Vol. 46, No. 5, May 2000, p. 710-723 [PROQUEST]) discloses a resource-constrained project scheduling problem with a focus on a branch-and-bound concept that can, by simple adaptations, operate on a wide range of problem settings.
- Zhang et al. (Zhang et al., A Macro-Level Scheduling Method Using Lagrangian Relaxation, IEEE Transactions on Robotics and Automation, Vol. 17, No. 1, February 2001, p. 70-79 [GOOGLE]) disclose a macro-level scheduling method using Lagrangian relaxation to provide high-level planning support for factories with multiple coordinating cells.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Heck whose telephone number is (703) 305-8215. The examiner can normally be reached Monday thru Friday between the hours of 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq R. Hafiz can be reached on (703) 305-9643.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

Any response to this action should be mailed to:

**Director of the United States Patent and Trademark Office**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**


Or faxed to:

**(703) 872-9306** [Official communications; including After Final communications labeled "**Box AF**"]

**(703) 746-9419** [Informal/Draft communication, labeled "**PROPOSED**" or "**DRAFT**"]

Hand delivered responses should be brought to Crystal Park 5, 2451 Crystal Drive, Arlington, Virginia, and the 7th floor receptionist.

mch  
4/30/2004

  
**TARIQ R. HAFIZ**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 3600**